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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re of Appellant Daniel A. Schoch ~~et al~~ Serial No.: 09/678,183 Filing Date: ~~October~~ 2, 2000 Title: DISPLACEMENT BASED DYNAMIC LOAD MONITOR	Art Group: 2857 Examiner: West, Jeffrey R.

APPEAL BRIEF

Hon. Commissioner of Patents and Trademarks
Alexandria, VA 22313-1450

Sir:

Appellant hereby submits the instant Appeal Brief in support of the Notice of Appeal from the Examiner to the Board of Patent Appeals and Interferences involving an appeal from the decision of the Examiner dated November 18, 2002, finally rejecting claims 1-26.

REAL PARTY IN INTEREST

The real party in interest of the above-captioned matter is The Minster Machine Company of Minster, Ohio, U.S.A.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1-26 in the instant application are pending and stand rejected. The claims involved in the instant appeal are Claims

1-26, a copy of which is enclosed herewith in the attached Appendix.

STATUS OF AMENDMENTS

None.

SUMMARY OF INVENTION

The subject matter of the invention is directed in one form to a system and method for use with a press machine that determines the load from dynamic deflection attributable to the tooling die set.

In a preferred form, a non-contact displacement sensor is used to develop data for use in producing a load slide displacement curve, i.e., a plot of slide displacement as a function of crank angle during a loading condition (tooling die set is deployed). Additionally, a suitable means such as a computer and equation is used to determine a no-load slide displacement curve, i.e., a plot of slide displacement as a function of crank angle during an unloaded condition (tooling die set is not deployed). In one form, the no load slide displacement curve has a theoretical formulation. (Page 15, lines 6 *et seq*. and Figs. 1-5).

In a further analysis routine, the load and no-load slide displacement curves are superimposed and aligned with one another so that each curve is aligned to a common specific start point

and end point intermediate between top dead center and the stock material contact point on the slide downstroke and upstroke, respectively. In one form, the start point and end point indicate portions of the slide travel where the load behavior and no-load behavior of the press are similar, i.e., little dynamic deflection is present.

Once the load and no-load slide displacement curves are matched and aligned, a differential calculation is performed between the respective data values of the curves at a plurality of slide positions to generate a collection of dynamic slide deflection values. In particular, the differential result computed by taking the difference between the load and no-load slide displacement curves (at a particular slide position) is a measurement of the dynamic deflection experienced by the press and induced by the tooling die set. In effect, the no-load slide displacement curve serves as a baseline reference for differential comparison with the load slide displacement curve.

The dynamic load caused by the now-computed dynamic deflection can be determined by a calculation that involves multiplying the dynamic deflection with a static stiffness value for the press.

One advantage of the invention is that no contact-type sensors are needed to determine dynamic deflection load. For

example, in certain conventional systems, load or pressure values are collected using contact sensors such as strain gauges that measure strain experienced by the machine. In the invention, the dynamic deflection is determined from non-contact means, such as a non-contact displacement sensor measuring slide displacement during load conditions and an equation providing a calculation of no-load slide displacement behavior.

ISSUES

Whether Claims 1 and 3 are unpatentable under 35 U.S.C. §103(a) over Mickowski in view of Schockman.

Whether Claims 2 and 4 are unpatentable under 35 U.S.C. §103(a) over Mickowski in view of Schockman, and further in view of Eigenmann.

Whether Claims 5, 7-10, 20, 21, 23 and 24 are unpatentable under 35 U.S.C. §103(a) over Mickowski in view of Schockman, and further in view of Fujii and Smith et al.

Whether Claims 6 and 22 are unpatentable under 35 U.S.C. §103(a) over Mickowski in view of Schockman, Fujii, and Smith, and further in view of Eigenmann.

Whether Claims 13 and 16 are unpatentable under 35 U.S.C. §103(a) over Mickowski in view of Schockman, Eigenmann, Fujii, and Smith, and further in view of Baserman.

Whether Claims 14, 15, 17-19, 25, and 26 are unpatentable under 35 U.S.C. §103(a) over Mickowski in view of Schockman, Eigenmann, Fujii, Smith, and Baserman, and further in view of Biondetti.

Whether Claims 1-4, 6, 11, 20-24, and 26 are unpatentable under 35 U.S.C. §112, first paragraph, as being based on a nonenabling disclosure.

Whether Claims 2, 4, and 21-24 are unpatentable under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

GROUPING OF CLAIMS

The claims of the group consisting of Claims 1 and 3 do not stand or fall together.

Appellant considers Claim 1 to be separately patentable from the other claims of this group.

Appellant considers Claim 3 to be separately patentable from the other claims of this group.

The claims of the group consisting of Claims 2 and 4 do not stand or fall together.

Appellant considers Claim 2 to be separately patentable from the other claims of this group.

Appellant considers Claim 4 to be separately patentable from the other claims of this group.

The claims of the group consisting of Claims 5, 7-10, 20, 21, 23, and 24 do not stand or fall together.

Appellant considers Claim 5 to be separately patentable from the other claims of this group.

Appellant considers the subgroup of Claims 7-10 to be separately patentable from the other claims of this group.

Appellant considers Claims 20, 21, 23, and 24 to be separately patentable from the other claims of this group.

The claims of the group consisting of Claims 6 and 22 do not stand or fall together.

Appellant considers Claim 6 to be separately patentable from the other claims of this group.

Appellant considers Claim 22 to be separately patentable from the other claims of this group.

The claims of the group consisting of Claims 13 and 16 do not stand or fall together.

Appellant considers Claim 13 to be separately patentable from the other claims of this group.

Appellant considers Claim 16 to be separately patentable from the other claims of this group.

The claims of the group consisting of Claims 14, 15, 17-19, 25, and 26 do not stand or fall together.

Appellant considers the subgroup of Claims 14 and 15 to be separately patentable from the other claims of this group.

Appellant considers Claim 17 to be separately patentable from the other claims of this group.

Appellant considers the subgroup of Claim 18 and 19 to be separately patentable from the other claims of this group.

Appellant considers Claim 25 to be separately patentable from the other claims of this group.

Appellant considers Claim 26 to be separately patentable from the other claims of this group.

ARGUMENT

For purposes herein, unless otherwise noted, all references to statements and rejections made by the Examiner refer to the Final Office Action dated November 18, 2002 (Paper No. 8) in the above-captioned matter.

I. REJECTION OF CLAIMS 1-3 UNDER 35 U.S.C. §103(a)

Citation of Supporting Authorities

The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. *MPEP §2112*. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of the result or characteristic. *Id.* To establish inherency, the evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *Id.*

To establish a prima facie case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *MPEP §2143*. The mere fact that references

can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *MPEP §2143.01.*

A. Rejection of Claim 1

Regarding the Claim 1 limitation directed to "providing an equation that can be utilized to calculate slide displacement as a function of press speed," the Examiner states as follows in relevant part:

> "Although Schockman doesn't specifically disclose providing these variables [press speed, stroke length, connection rod length, and drive connection information], with an equation, to a computational device to determine the curves [inertia force versus crank angle and slide displacement versus crank angle], it is considered <u>inherent</u> that some type of equation or formula <u>must</u> be used to translate the variable information into the load and displacement curves." (Emphasis added). (Insertion added). (Final Office Action, ¶8).

However, Appellant respectfully submits that Schockman does not inherently (i.e., necessarily) disclose the use of equations, generally, to derive such curves, and, more specifically, to calculate slide displacement as a function of press speed, as set forth in Claim 1. For purposes of establishing inherency, Schockman must necessarily disclose the use of equations in the context of curve forming. It must not simply be probable or possible that Schockman employs equations in the manner described

by the Examiner; the use of equations must necessarily be present in Schockman.

The Examiner refers to Col. 4, lines 5-20 to demonstrate various types of variable information and states that some type of equation or formula must be used to translate such variable information into the curves. However, it is not at all necessarily evident that the curve formation requires the translation of such variable information into inertia force and slide displacement data.

The variables referenced by the Examiner simply pertain to features of the press environment, e.g., strokes per minute, stroke length, and connection length, and do not of themselves compel the conclusion that the curve formation must be derived from an equation that manipulates such variable data. For example, it is believed that the data for the indicated inertia force curves (Figs. 1, 2 and 4) and the slide displacement curve (Fig. 6) may be produced not by an equation but by readings taken directly from suitable sensors. In this manner, the measured data readings can then be plotted as a function of crank angle without the use of any equation for deriving such values of inertia force and slide displacement.

In view of the foregoing, Appellant respectfully submits that Claim 1 is patentable over Mickowski in view of Schockman

since these references neither teach nor suggest, *inter alia*, the Claim 1 limitation directed to providing an equation to calculate slide displacement as a function of press speed.

As a separate ground for establishing patentability, even assuming for argument purposes (without admission) that Schockman discloses the use of equations in curve forming, it does not necessarily follow that Schockman discloses the specific equation recited by Claim 1, namely, an equation that can be utilized to calculate slide displacement as a function of press speed.

Schockman discloses curves that depict inertia force as a function of crank angle and slide displacement as a function of crank angle. Mickowski discloses curves that depict velocity, temperature, and pressure as a function of slide displacement. However, the relevant claim limitation pertains to slide displacement as a function of press speed.

In this regard, it therefore would not be obvious as the Examiner suggests to modify the invention of Mickowski to include providing an equation for calculating the slide displacement as a function of press speed, simply because (as the Examiner states) Schockman suggests a method for determining slide displacement curves that takes into account the specification of a double action press that effect its displacement. Schockman merely mentions a particular stroke per minute value for the indicated

press run; this teaching is insufficient to support the assertion that Schockman teaches an equation describing slide displacement as a function of press speed.

In view of the foregoing, Appellant respectfully submits that Claim 1 is patentable over Mickowski in view of Schockman since these references neither teach nor suggest, *inter alia*, the Claim 1 limitation directed to providing an equation to calculate slide displacement as a function of press speed.

As a further separate ground for establishing patentability, even assuming for argument purposes (without admission) that Schockman discloses the use of equations in curve forming, it would not be obvious as the Examiner suggests to modify Mickowski to utilize such equations in its curve forming operations.

It is an express purpose of Mickowski to use a transducer assembly (transducers 2, 3, 4 and 5) to provide data readings employed by a computer (CRT 6) to display curve traces depicting pressure, temperature and velocity as a function of stroke position. (Col. 4, lines 34 *et seq.*). Accordingly, the data for generating the curves is assembled with transducers that take a series of readings that are plotted as a function of stroke position.

In view of the express teaching and desirability manifested by Mickowski concerning the use of transducers to generate data

values for developing the relevant curves, Appellant considers that Mickowski teaches away from the use of equations to determine such curves, or at least that such use is not obvious. At best, it is believed that the modification of Mickowski to employ equations as proposed by the Examiner constitutes an improper obvious to try rationale insufficient to support an obviousness rejection.

In view of the foregoing, Appellant respectfully submits that Claim 1 is patentable over Mickowski in view of Schockman since there is no adequate motivation to combine the references in the manner proposed by the Examiner, namely, in respect of modifying Mickowski to include the purported Schockman teaching of utilizing equations in curve forming.

As a further separate ground for establishing patentability, regarding the Claim 1 limitation directed to calculating the <u>theoretical</u> distance above bottom dead center for each increment of a slide stroke (in conjunction with the equation that can be utilized to calculate slide displacement as a function of press speed), the Examiner states as follows in relevant part:

> "Mickowski also discloses ... plotting, on the display, the velocity as a function of displacement and a superimposed theoretical profile in order to compare the actual and theoretical curves ... (column 4, lines 46-50 and 57-66)."

The purported theoretical curve identified by the Examiner relates to the master profile. However, the master profile is not a theoretical profile but relates to a production-based trace developed from relevant transducer readings obtained as the ram undergoes a production cycle. In this regard, Mickowski discloses as follows in relevant part:

> "An illustrated display of a typical profile 14 representative of the velocity of the injection ram for a production cycle as a function of stroke position, i.e., the position of the reciprocating injection ram along the stroke length, is shown on the CRT 6." (Col. 4, lines 46-50)."
>
> "One of the superimposed traces may represent a master profile defined as an idealized or acceptable profile and may simply represent a previously recorded profile." (Col. 4, lines 62-65).
>
> "By providing this ability to superimpose master profiles over a current profiles, a non-technically trained person can readily distinguish between a master trace identifying a production run classified as acceptable or good and the current production run representing the current profile." (Col. 5, lines 8-13).

In view of the foregoing, Appellant respectfully submits that Claim 1 is patentable over Mickowski in view of Schockman since these references neither teach nor suggest, *inter alia*, the Claim 1 limitation directed to calculating the theoretical distance above bottom dead center for each increment of a slide stroke.

Appellant respectfully requests reversal of the rejection as applied to Claim 1.

B. Rejection of Claim 3

Appellant respectfully submits that Claim 3 is patentable over Mickowski in view of Schockman for reasons similar to those advanced *supra* (Part A) in connection with the rejection of Claim 1.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part A) and applies it in a similar manner to furnish defense of the patentability of Claim 3.

In view of the foregoing, Appellant respectfully submits that Claim 3 is patentably distinguishable over Mickowski in view of Schockman and respectfully requests reversal of the rejection as applied thereto.

II. REJECTION OF CLAIMS 2 and 4 UNDER 35 U.S.C. §103(a)

A. Rejection of Claim 2

Appellant respectfully submits that Claim 2 is patentable over Mickowski in view of Schockman, and further in view of Eigenmann since it depends from patentably distinguishable base Claim 1, as established *supra* (Part I-A).

Appellant respectfully requests reversal of the rejection as applied thereto.

B. Rejection of Claim 4

Appellant respectfully submits that Claim 4 is patentable over Mickowski in view of Schockman, and further in view of Eigenmann since it depends from patentably distinguishable base Claim 3, as established *supra* (Part I-B).

Appellant respectfully requests reversal of the rejection as applied thereto.

III. REJECTION OF CLAIMS 5, 7-10, 20, 21, 23 and 24

UNDER 35 U.S.C. §103(a)

A. Rejection of Claim 5

The Claim 5 limitation directed to generating a theoretical no load slide displacement curve for the press is not disclosed by the cited art, particularly Mickowski in view of Schockman which are ostensibly relied upon by the Examiner to disclose this limitation.

Mickowski is relied upon by the Examiner to disclose the purported slide displacement curves. However, the Mickowski curves all relate to production cycles, namely, loading conditions. In this regard, Mickowski discloses as follows in relevant part:

> "An illustrated display of a typical profile 14 representative of the velocity of the injection ram for a production cycle as a function of stroke position, i.e., the position of the reciprocating injection ram

along the stroke length, is shown on the CRT 6." (Col. 4, lines 46-50)."

"One of the superimposed traces may represent a master profile defined as an idealized or acceptable profile and may simply represent a previously recorded profile. A master profile is used for comparison purposes with a current profile. A current profile is defined as a profile trace formed on the CRT from data received by the microprocessor from one of the transducers in response to a current production cycle." (Col. 4, line 62 to Col. 5, line 2).

"By providing this ability to superimpose master profiles over a current profiles, a non-technically trained person can readily distinguish between a master trace identifying a production run classified as acceptable or good and the current production run representing the current profile." (Col. 5, lines 8-13).

The combination proposed by the Examiner therefore does not disclose, *inter alia*, the limitation pertaining to a theoretical <u>no load</u> slide displacement curve for the press, as set forth in Claim 5.

As a further separate ground for establishing patentability, Appellant submits that the combination proposed by the Examiner does not teach or suggest the Claim 5 limitation directed to generating the <u>theoretical</u> no load slide displacement curve for the press, for reasons similar to those advanced *supra* regarding the rejection of Claim 1 (Part I-A).

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion

advanced *supra* (Part A) and applies it in a similar manner to furnish defense of the patentability of Claim 5.

As a further separate ground for establishing patentability, regarding the Claim 5 limitations directed to establishing a start point on the slide downstroke between top dead center and the contact point, and establishing an end point on the slide upstroke between top dead center and the contact point, the Examiner states as follows in relevant part:

> "Although Smith doesn't specifically disclose labeling the starting point as a point between the top dead center and the contact point or the ending point as a point between the contact point and top dead center, since the applicant describes using the starting and ending points only as a comparison tool, the limitation that the starting point be at a position past the actual start of machining, is considered to be an engineering design choice." (¶10).

However, Appellant submits that the proffered rationale of an engineering design choice to justify the Examiner's characterization of the Smith teachings is an insufficient basis for making the proposed modification. The particular use of starting and ending points is relevant to the invention (and not merely an engineering design choice) because it facilitates an identification of portions of the slide travel where the load and no-load slide displacement curves are similar. It appears that the Examiner has employed impermissible hindsight of Appellant's

specification (use of starting/ending points as a comparison tool) as a foundation for revising the teachings of Smith to satisfy the relevant limitations of Claim 5.

In view of the foregoing, Appellant submits that the cited art cannot be combined and modified in the manner proposed by the Examiner to produce the invention.

As a further separate ground for establishing patentability, even if the combination proposed by the Examiner was permissible, it nevertheless would not yield the invention as a whole.

In particular, it does not appear that the Examiner has stated the manner in which the proposed combination satisfies the Claim 5 limitations directed to identifying the points on the theoretical slide displacement curve corresponding to the start point and the end point, identifying the points on the actual slide displacement curve corresponding to the start point and the end point, superimposing the identified start points on the theoretical and actual slide displacement curves, and superimposing the identified end points on the theoretical and actual slide displacement curves so that the theoretical and actual slide displacement curves can be compared to obtain indicators of press performance. Appellant submits that these limitations are not disclosed by the cited art nor the combination proposed by the Examiner.

It appears that Fujii is offered solely to purportedly satisfy the "determining" limitation and that Smith is offered solely to purportedly satisfy the "establishing" limitations.

The Examiner states that "further, the labeled diagram presented by Smith would have provided a clearer representation of the slide displacement for implementing the comparison described in the invention of Mickowski and Schockman." However, Appellant believes that in no way does this statement offer any basis for establishing that the combination proposed by the Examiner teaches the identification steps and superimposing steps set forth in Claim 5, much less the obviousness of incorporating such features into the Mickowski and Schockman apparatus. Further, to the extent that the Examiner relies upon Smith to teach that the established start point and end point are then identified on the no-load slide displacement curve and the load slide displacement curve to facilitate superimposition of the respective no-load and load curves, Appellant submits that impermissible hindsight of Appellant's disclosure is being used.

In view of the foregoing, Appellant respectfully submits that Claim 5 is patentably distinguishable over Mickowski in view of Schockman, and further in view of Fujii and Smith et al., and respectfully requests reversal of the rejection as applied thereto.

B. Rejection of Claims 7-10

Appellant respectfully submits that Claims 7-10 are patentable over Mickowski in view of Schockman, and further in view of Fujii and Smith et al., since they depend from patentably distinguishable base Claim 5, as established *supra* (Part III-A).

Appellant respectfully requests reversal of the rejection as applied thereto.

C. Rejection of Claims 20, 21, 23, and 24

Appellant respectfully submits that Claim 20 is patentable over Mickowski in view of Schockman, and further in view of Fujii and Smith et al., for reasons similar to those advanced *supra* (Part III-A) in connection with the rejection of Claim 5 vis-à-vis the limitations directed to the steps of establishing start point and end points, identifying corresponding start points and end points on the theoretical and actual slide displacement curves, and superimposing the identified points on the curves to facilitate comparison.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part III-A) and applies it in a similar manner to furnish defense of the patentability of Claim 20.

As a further separate ground for establishing patentability, Appellant respectfully submits that Claim 20 is patentable over

Mickowski in view of Schockman, and further in view of Fujii and Smith et al., for reasons similar to those advanced *supra* (Part I-A) in connection with the rejection of Claim 1 vis-à-vis the limitation directed to a theoretical slide displacement curve.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part I-A) and applies it in a similar manner to furnish defense of the patentability of Claim 20.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 20 and Claims 21, 23, and 24 dependent therefrom.

IV. REJECTION OF CLAIMS 6 and 22 UNDER 35 U.S.C. §103(a)

A. Rejection of Claim 6

Regarding the Claim 6 limitations directed to providing an equation that can be utilized to calculate slide displacement as a function of press speed, and calculating the theoretical distance above bottom dead center for each time increment of a slide stroke, Appellant respectfully submits that Claim 6 is patentable over Mickowski in view of Schockman, Fujii, and Smith, and further in view of Eigenmann, for reasons similar to those advanced *supra* (Part I-A) in connection with the rejection of Claim 1 vis-à-vis limitations similar to those mentioned above in claim 6.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part I-A) and applies it in a similar manner to furnish defense of the patentability of Claim 6.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 6.

Eigenmann is offered only to purportedly disclose a teaching relating to bearing size and therefore does not overcome the deficiencies of the other cited art in combination therewith.

B. Rejection of Claim 22

Appellant respectfully submits that Claim 22 is patentable over the cited art because it depends from patentably distinguishable base Claim 20, as established *supra* (Part III-C).

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 22.

V. REJECTION OF CLAIMS 13 and 16 UNDER 35 U.S.C. §103(a)

A. Rejection of Claim 13

The Examiner states as follows in relevant part:

> "It would have been obvious ... to modify the invention of Mickowski, Schockman, Eigenmann, Fujii, and Smith to include a value of static stiffness ... for calculating the load on the press ... by multiplying the value of dynamic deflection ... by the value of static stiffness, as taught by Baserman, because the combination would have provided a method for determining the necessary values for plotting the load vs. displacement, as taught by Mickowski, and the load vs. crank angle, as taught by

> Schockman, using a known characteristic-dependent load formula." (Emphasis added). (¶12).

However, as stated before, Mickowski expressly and desirably accounts for the pressure (load) measurement by a suitable transducer 2 and therefore no load computation is deemed necessary as the Examiner asserts. Further, it is believed that Schockman similarly utilizes non-computational means for acquiring the inertia force values. Accordingly, it is believed that the motivation to combine relied upon by the Examiner is inadequate to support the obviousness rejection.

As a further separate ground for patentability, even assuming for argument purposes (without admission) that Mickowski and Schockman would employ a computational or calculative means to derive the load plots, it nevertheless is seen that it would not be obvious to combine the art teachings in the manner proposed by the Examiner to produce the invention, namely, the limitation directed to calculation of press load utilizing a value of dynamic deflection.

In both Mickowski and Schockman, regarding the respective load curves (pressure versus stroke position in Mickowski and inertia force versus crank angle in Schockman), the load values are absolute (not relative) quantities and therefore do not

reflect a differential or comparative load measurement, i.e., dynamic deflection due to the different press responses when operating in a loaded state (with tooling) and a non-loaded state (without tooling). Accordingly, even if a calculation operation was applied to the development of the Mickowski and Schockman curves, as the Examiner proposes, the resultant load calculations would not constitute load calculations based upon dynamic deflection, as set forth in Claim 13.

Further, in Mickowski, the curve traces that are superimposed for comparative purposes (i.e., the master profile and current profile) both correspond to a loaded state, and therefore no teaching of dynamic deflection (loaded versus unloaded comparison) is evident. The inertia force curves of Schockman likewise exclusively refer to loaded conditions.

The mere fact that Baserman discusses deflection of a disk drive suspension arm hardly suffices as a basis for so substantially altering the other cited art (specifically the load curves of Mickowski and Schockman), particularly when these principal references neither teach nor suggest dynamic deflection or dynamic load, i.e., a comparison of loaded and unloaded conditions.

Moreover, it bears noting that the characteristic curve of Eigenmann (Fig. 7) relates to immersion depth versus strokes rate, not a deflection measurement value.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 13.

B. Rejection of Claim 16

Appellant respectfully submits that Claim 16 is patentable over Mickowski in view of Schockman, Eigenmann, Fujii, and Smith, and further in view of Baserman, for reasons similar to those advanced *supra* (Part V-A) in connection with the rejection of Claim 13.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part V-A) and applies it in a similar manner to furnish defense of the patentability of Claim 16.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 16.

VI. REJECTION OF CLAIMS 14, 15, 17-19, 25 and 26 UNDER 35 U.S.C. §103(a)

A. Rejection of Claims 14 and 15

The combination proposed by the Examiner does not teach or suggest any measurement or graphical plotting pertaining to a <u>no load</u> slide displacement curve, as set forth in Claim 14.

In particular, regarding the principal references of Mickowski and Schockman relied upon for the teaching of load curves (i.e., pressure versus stroke position in Mickowski and inertia force versus crank angle in Schockman), the load values disclosed by these references are absolute (not relative) quantities and therefore do not reflect a differential or comparative load measurement, i.e., dynamic deflection due to the different press responses when operating in a loaded state (with tooling) and a non-loaded state (without tooling). As stated above, the superposition of trace profiles in Mickowski relates to two loaded state curves.

The mere fact that Biondetti simply teaches bending of a beam under load hardly suffices as a basis for altering the references so substantially (specifically Mickowski and Schockman) to include a no-load slide displacement curve superimposed with a load slide displacement curve, particularly when these principal references neither teach nor suggest dynamic deflection or dynamic load, i.e., a comparison of loaded and unloaded conditions.

Accordingly, since the references neither teach nor suggest a no-load slide displacement curve, the Examiner's entire statement of obviousness regarding the modification of the references vis-à-vis no-load slide displacement measurements is unsupportable and the rejection cannot be sustained.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 14 and Claim 15 dependent therefrom.

B. <u>Rejection of Claim 17</u>

Regarding the Claim 17 limitations directed to generating a theoretical <u>no load</u> value of slide displacement, computing the difference between the theoretical <u>no load</u> value and the actual load value of slide displacement, and establishing the difference between the theoretical <u>no load</u> value and the actual load value of slide displacement as the value of dynamic deflection, Appellant respectfully submits that the cited art neither teaches nor suggests such limitations for reasons similar to those advanced *supra* (Part VI-A) in connection with the rejection of Claim 14 vis-à-vis the limitation therein pertaining to the distance measurement between the no load slide displacement curve and actual load slide displacement curve.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part VI-A) and applies it in a similar manner to furnish defense of the patentability of Claim 17.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 17.

C. <u>Rejection of Claims 18 and 19</u>

Regarding the Claim 18 limitations directed to determining dynamic deflection values, and calculating load values based upon the dynamic deflection values, Appellant respectfully submits that the cited art neither teaches nor suggests such limitations for reasons similar to those advanced *supra* (Part V-A) in connection with the rejection of Claim 13 vis-à-vis the limitations therein pertaining to determining a value of dynamic deflection and calculating load on the press by multiplying the dynamic deflection value by the value of static stiffness.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part V-A) and applies it in a similar manner to furnish defense of the patentability of Claim 18.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 18 and Claim 19 dependent therefrom.

D. Rejection of Claim 25

Regarding the Claim 25 limitation directed to a computational device, and specifically the computation of a theoretical no load value of slide displacement, computation of a dynamic deflection value by computing the difference between the theoretical no load value and the corresponding actual load value of slide displacement, and multiplication of the dynamic deflection value by the static stiffness value to determine a press load value, Appellant respectfully submits that the cited art neither teaches nor suggests such limitations for reasons similar to those advanced *supra* in connection with the rejection of Claim 13 (Part V-A), Claim 14 (Part VI-A), Claim 16 (Part V-B), and Claim 17 (Part VI-B).

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Parts V-A, VI-A, V-B, and VI-B) and applies it in a similar manner to furnish defense of the patentability of Claim 25.

In brief, the cited art neither teaches nor suggests such computation of a theoretical no load value of slide displacement, computation of dynamic deflection by computing the difference between the no load value and the corresponding load value of slide displacement, and determination of a press load value employing dynamic deflection.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 25.

E. Rejection of Claim 26

Regarding the Claim 26 limitation directed to an equation for generating theoretical slide displacement values, Appellant respectfully submits that the cited art neither teaches nor suggests such limitation for reasons similar to those advanced *supra* (Part I-A) in connection with the rejection of Claim 1 vis-à-vis the limitations therein pertaining to providing an equation that can be utilized to calculate slide displacement as a function of press speed.

Accordingly, Appellant incorporates immediately hereinafter by reference thereto the applicable portions of the discussion advanced *supra* (Part I-A) and applies it in a similar manner to furnish defense of the patentability of Claim 26.

In view of the foregoing, Appellant respectfully requests reversal of the rejection as applied to Claim 26.

VII. CLAIMS 11 AND 12

Appellant respectfully submits that Claims 11 and 12 are patentable over the art cited of record. No art rejection has been applied to these claims.

VIII. REJECTION OF CLAIMS 1-4, 6, 11, 20-24, AND 26 UNDER 35 U.S.C. §112, FIRST PARAGRAPH

Citation of Supporting Authorities

The test of enablement is whether the experimentation needed to practice the invention is undue or unreasonable. *MPEP §2164.01*. Accordingly, the test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation. *Id.* The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. *Id.*

Discussion

The non-enabling rejection is predicated upon the claim limitation directed to an equation which can be used for generating a theoretical slide displacement curve and which

includes variables to account for press parameters affecting slide displacement.

Various exemplary ones of the variables are listed in the claims and the specification, e.g., connecting rod length, stroke length, drive type, bearing size, press speed, and press geometry. Figures 4 and 5 graphically depict in the indicated curves exemplary relationships involving slide displacement as a function of crank angle.

Appellant respectfully submits that a *prima facie* case of non-enablement has not been established since the Examiner has failed to specify why one skilled in the art could not supply the information deemed missing by the Examiner without undue experimentation. *MPEP §2164.04.* In the alternative, Appellant submits that undue experimentation is not needed to enable one skilled in the art to practice the invention with respect to the equation for calculating slide displacement as a function of press speed.

Referring to the undue experimentation factors enumerated at MPEP §2164.01(a), Appellant respectfully submits that such factors considered as a whole weigh in favor of enablement without undue experimentation. For example, the nature of the invention and the state of the prior art relate to a well

developed field of art pertaining to press machines, specifically press motion and load activity measurements. The level of one skilled in the art is sufficiently adequate, as a skilled artisan in the field would have a knowledge of press load activity, press motion activity, and the mathematical models for representing the press behavior. It is also believed that the quantity of experimentation needed to develop such an equation would not be undue, in view of the belief by Appellant that equations and other mathematical models representing press motion behavior are standard tools available to those skilled in the art.

In view of the foregoing, Appellant requests reversal of this rejection.

IX. <u>REJECTION OF CLAIMS 2, 4, and 21-24</u>

<u>UNDER 35 U.S.C. §112, FIRST PARAGRAPH</u>

<u>Discussion</u>

The Examiner states that these claims are rejected because they incorporate and fail to correct the lack of clarity present in parent claims 1, 3, and 20 vis-à-vis the rejection thereof under 35 U.S.C. §112, first paragraph, pertaining to the enablement requirement.

In view of the foregoing discussion (Part VIII) regarding compliance of Claims 1-4, 6, 11, 20-24, and 26 with the enablement requirement of 35 U.S.C. §112, first paragraph,

Appellant respectfully submits that Claims 2, 4 and 21-24 likewise comply with the written disclosure requirement of 35 U.S.C. §112, first paragraph.

Appellant requests reversal of this rejection.

If the Examiner or Board has any questions or comments that would advance prosecution of this case, the Examiner or Board is invited to call the undersigned at 260/485-6001.

Respectfully submitted,

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Encs: Appendix of Clean Claims
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on: July 25, 2003.

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Name of Registered Representative

Signature

July 25, 2003
Date

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APPENDIX OF CLAIMS UNDER APPEAL

1. A method of generating a theoretical slide displacement curve for a mechanical press, comprising:

providing an equation that can be utilized to calculate slide displacement as a function of press speed, the equation including variables to account for press parameters which effect slide displacement;

providing a computational device;

determining the speed of the press;

determining the equation variables;

communicating the equation, the speed of the press and the equation variables to the computational device;

calculating the theoretical distance above bottom dead center for each increment of a slide stroke; and

plotting the calculated distance above bottom dead center values vs. time.

2. The method of Claim 1, wherein said step of determining the equation variables comprises:

determining the appropriate variable corresponding to the press drive mechanism of the mechanical press;

determining the appropriate variable corresponding to the connecting rod length of the mechanical press;

determining the appropriate variable corresponding to the stroke length of the mechanical press; and

determining the appropriate variable corresponding to the bearing size of the mechanical press.

3. An apparatus for generating a theoretical slide displacement curve for a mechanical press, comprising:

a speed sensor for sensing a value of press speed;

input means for inputting a plurality of variables corresponding to characteristics of the press;

storage means for storing an equation which can be used for generating the theoretical slide displacement curve, said equation utilizing said plurality of variables corresponding to characteristics of the press and said value of press speed to generate the theoretical slide displacement curve; and

computer processor means for generating the theoretical slide displacement curve, said computer processor means communicatively connected to said sensor means, said input means and said storage means.

4. The data processing system as recited in Claim 3, wherein said plurality of variables comprises:

a value of connecting rod length;

a value of stroke length;

a value of drive type; and

a value of bearing size.

5. A method of monitoring performance parameters for a mechanical press, comprising:

generating a theoretical no load slide displacement curve for the press;

generating an actual slide displacement curve during a load condition of the press;

determining the contact point on the actual slide displacement curve which corresponds to the slide contacting the stock material;

establishing a start point on the slide downstroke between top dead center and the contact point;

establishing an end point on the slide upstroke between top dead center and the contact point;

identifying the points on the theoretical slide displacement curve corresponding to the start point and the end point;

identifying the points on the actual slide displacement curve corresponding to the start point and the end point;

superimposing the identified start points on the theoretical and actual slide displacement curves; and

superimposing the identified end points on the theoretical and actual slide displacement curves so that the

theoretical and actual slide displacement curves can be compared to obtain indicators of press performance.

6. The method of Claim 5, wherein said step of generating a theoretical no load slide displacement curve comprises:

providing an equation that can be utilized to calculate slide displacement as a function of press speed, the equation including variables corresponding to press drive mechanism, connecting rod length, stroke length, and bearing size;

determining the speed of the press;

determining the appropriate variable corresponding to the press drive mechanism of the mechanical press;

determining the appropriate variable corresponding to the connecting rod length of the mechanical press;

determining the appropriate variable corresponding to the stroke length of the mechanical press;

determining the appropriate variable corresponding to the bearing size of the mechanical press;

providing a computational device;

communicating the equation, the speed of the press and the equation variables to the computational device;

calculating the theoretical distance above bottom dead center for each time increment of a slide stroke; and

plotting the calculated distance above bottom dead center values vs. time.

7. The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press; and

plotting slide displacement vs. crank angle.

8. The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press; and

plotting slide displacement vs. time.

9. The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press using a non-contact displacement sensor; and

plotting slide displacement vs. crank angle.

10. The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press using a non-contact displacement sensor; and

plotting slide displacement vs. time.

11. The method of Claim 5, wherein said step of determining the contact point on the actual slide displacement curve comprises:

determining the first inflection point on the actual slide displacement curve; and

establishing the contact point on the actual slide displacement curve as the first inflection point on the actual slide displacement curve.

12. The method of Claim 5, further comprising:

calculating the distance between the theoretical slide displacement curve and the actual slide displacement curve at a plurality of increments on the slide upstroke between the contact point and the end point;

calculating initially the sum of the distances between the theoretical slide displacement curve and the actual slide displacement curve at each increment;

shifting the actual slide displacement curve;

recalculating the sum of the distances between the theoretical slide displacement curve and the actual slide displacement curve at each increment; and

repeating the shifting and recalculating steps until the sum of the distances between the theoretical slide displacement curve and the actual slide displacement curve at each increment reaches a minimum value.

13. The method of Claim 5, further comprising:

determining a value of dynamic deflection;

determining the value of static stiffness for the press being monitored;

providing a computational device;

communicating the value of dynamic deflection and the value of static stiffness to the computational device; and

calculating load on the press at any point of the slide stroke by multiplying the value of dynamic deflection for the relevant point of the slide stroke by the value of static stiffness.

14. The method of Claim 13, wherein said step of determining a value of dynamic deflection comprises:

measuring the distance along the ordinate between the theoretical no load slide displacement curve and the actual slide displacement curve.

15. The method of Claim 14, further comprising:

calculating load on the press for each time increment of a slide stroke; and

plotting calculated load vs. time.

16. A method of monitoring load on a mechanical press without using a contact load sensor, said method comprising:

determining a value of dynamic deflection;

determining the value of static stiffness for the press being monitored;

providing a computational device;

communicating the value of dynamic deflection and the value of static stiffness to the computational device; and

calculating load on the press at any point of the slide stroke by multiplying the value of dynamic deflection for the relevant point of the slide stroke by the value of static stiffness.

17. The method of Claim 16, wherein said step of determining a value of dynamic deflection comprises:

generating a theoretical no load value of slide displacement;

generating a calculated actual load value of slide displacement corresponding in time to the theoretical no load value of slide displacement;

computing the difference between the theoretical no load value and the actual load value of slide displacement; and

establishing the difference between the theoretical no load value and the actual load value of slide displacement as the value of dynamic deflection.

18. The method of Claim 16, further comprising:

determining a plurality of values of dynamic deflection at increments of the entire slide stroke; and

calculating a plurality of load values corresponding to the plurality of dynamic deflection values.

19. The method of Claim 18, further comprising:

generating a plot of load vs. time for a slide stroke of the press.

20. An apparatus for monitoring a running press, comprising:

a speed sensor for sensing a value of press speed;

input means for inputting a plurality of variables corresponding to characteristics of the press; and

storage means for storing an equation which can be used for generating the theoretical slide displacement curve, said equation utilizing said plurality of variables corresponding to characteristics of the press and said value of press speed to generate the theoretical slide displacement curve;

a computational device for generating the theoretical slide displacement curve, said computational device

communicatively connected to said sensor means, said input means and said storage means; and

a non-contact displacement sensor for sensing slide displacement during an actual load condition of the press, said non-contact displacement sensor communicatively connected to said computational device, said computational device plotting sensed slide displacement vs. a count quantity, said computational device determining the contact point on the actual slide displacement curve which corresponds to the slide contacting the stock material, said computational device establishing a start point on the slide downstroke between top dead center and the contact point, said computational device establishing an end point on the slide upstroke between top dead center and the contact point, said computational device identifying the points on the theoretical slide displacement curve corresponding to the start point and the end point, said computational device identifying the points on the actual slide displacement curve corresponding to the start point and the end point, said computational device superimposing the identified start points on the theoretical and actual slide displacement curves, said computational device superimposing the identified end points on the theoretical and actual slide displacement curves so that the

theoretical and actual slide displacement curves can be compared to obtain indicators of press performance.

21. The apparatus as recited in Claim 20, wherein said computational device comprises:

a microprocessor.

22. The apparatus as recited in Claim 20, wherein said plurality of variables comprises:

a value of connecting rod length;

a value of stroke length;

a value of drive type; and

a value of bearing size.

23. The apparatus as recited in Claim 20, wherein said count quantity is a measure of time.

24. The apparatus as recited in Claim 20, wherein said count quantity is a measure of crank angle.

25. An apparatus for monitoring the load on a mechanical press, comprising:

a speed sensor for sensing the speed of the press;

a non-contact displacement sensor for sensing slide displacement during an actual load condition of the press;

input means for inputting a plurality of variables corresponding to characteristics of the press; and

a computational device, said computational device communicatively connected to said speed sensor, said non-contact displacement sensor and said input means, said computational device computing a theoretical no load value of slide displacement, said computational device computing a value of dynamic deflection by computing the difference between the theoretical no load value and the corresponding actual load value of slide displacement, said computational device multiplying the value of dynamic deflection by the value of static stiffness of the mechanical press to determine a value of load on the press at a point of the slide stroke.

26. The apparatus as recited in Claim 25, wherein said plurality of variables comprises:

a value of static stiffness corresponding to the press being monitored;

an equation for generating theoretical slide displacement values, said equation including variables corresponding to press drive mechanism, connecting rod length, stroke length, and bearing size;

a value of connecting rod length;

a value of stroke length;

a value of drive type; and

a value of bearing size.